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Indian Standard

RADIAL INTERNAL CLEARANCES IN UNLOADED RADIAL ROLLING BEARINGS

(First Revision)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

August **1992** **Price Group 3**

Rolling Bearings Sectional Committee, LM 12

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rolling Bearings Sectional Committee had been approved by the Light Engineering Division Council.

This standard was originally published in 1970. The revision has been taken up to align the standard with the latest international standard ISO 5753 : 1981 Rolling bearings — Radial internal clearances and the current trade practices being followed in the country. In this revision, following modifications have been incorporated:

i) Radial groove type ball bearing with cylindrical bore, acceptance limits as well as manufacturing limits has been incorporated under Group 5.

ii) Double row self aligning ball bearing with cylindrical bore and with tapered bore, acceptance limits has been incorporated under Group 5.

iii) Cylindrical roller bearing with cylindrical bore, acceptance limits has been incorporated under Group 5.

iv) Double row self aligning roller bearing with cylindrical and with tapered bore acceptance limits has been incorporated under Group 5.

In the formulation of this standard considerable assistance has been derived from ISO 5753 : 1981.

Indian Standard

RADIAL INTERNAL CLEARANCES IN UNLOADED RADIAL ROLLING BEARINGS

(First Revision)

1 SCOPE

1.1 This standard covers radial internal clearances for radial ball and roller bearings.

2 DEFINITION

2.1 Radial Internal Clearances

The internal radial clearance of a non-preloaded ball or roller bearing, capable of taking pure radial load, is defined as the average of the total displacements perpendicular to the bearing axis to which one of the bearing rings, the other bearing ring being held stationary, may be subjected in different angular directions in relation to the rotatable, as well as the stationary ring, and with different angular positions of the set of rolling bodies in relation to the bearing rings. If the movable ring, without being subjected to any external load, is moved from contact with the rolling bodies in one eccentric extreme position into contact with the rolling bodies in the diametrically opposite extreme position, with the axial position of the contacting part of the movable ring in relation to the stationary ring in both cases permitting the greatest eccentric displacement, and with the rolling bodies, unrestrained by frictional forces, assuming such a position between the races of both rings that the movable ring may take up absolutely extreme eccentric positions in relation to the stationary ring.

3 LIMITATION

3.1 In applying any particular measuring method, allowance should be made on tolerance for the effect of measuring load and inherent variations in the apparatus.

4 VALUES OF RADIAL INTERNAL CLEARANCES

4.1 Radial Groove Type Ball Bearings with Cylindrical Bore

Table 1 Radial Groove Type Ball Bearings with Cylindrical Bore

Values in micrometres.

		Group 2				Group 0 (Normal Group)				Group 3				Group 4				Group 5			
Bearing Bore Diameter *d* mm		Acceptance Limits	Manufacturing limits			Acceptance Limits	Manufacturing limits			Acceptance Limits	Manufacturing limits			Acceptance Limits	Manufacturing limits			Acceptance Limits	Manufacturing limits		
Over	Incl	Low	Low	High	High	Low	Low	High	High	Low	Low	High	High	Low	Low	High	High	Low	Low	High	High
2.5	6	—	0	6	7	2	4	11	13	8	10	20	23	—	—	—	—	—	—	—	—
6	10	—	0	6	7	2	4	11	13	8	10	20	23	14	16	26	29	20	24	34	37
10	18	—	0	8	9	3	5	15	18	11	13	23	25	18	20	30	33	25	28	40	45
18	24	—	0	9	10	5	7	17	20	13	15	25	28	20	23	33	36	28	31	43	48
24	30	—	0	10	11	5	8	18	20	13	15	25	28	23	25	38	41	30	34	48	53
30	40	—	0	10	11	6	8	18	20	15	18	30	33	28	30	43	46	40	43	59	64
40	50	—	0	10	11	6	8	20	23	18	20	33	36	30	33	48	51	45	48	68	73
50	65	—	3	13	15	8	10	25	28	23	25	41	43	38	41	58	61	55	58	84	90
65	80	—	3	13	15	10	13	28	30	25	28	48	51	46	48	69	71	65	69	99	105
80	100	—	3	15	18	12	15	33	36	30	33	56	58	53	56	81	84	75	81	115	120
100	120	—	3	18	20	15	18	38	41	36	38	63	66	61	63	94	97	90	94	135	140
120	140	—	3	20	23	18	20	46	48	41	46	76	81	71	76	109	114	105	109	154	160
140	160	—	3	20	23	18	20	51	53	46	51	86	91	81	86	124	130	120	124	174	180
160	180	—	3	23	25	20	23	58	61	53	58	97	102	91	97	140	147	135	140	195	200
180	200	—	3	28	30	25	28	69	71	63	69	112	117	107	112	157	163	150	157	222	230

NOTE — In principle, the manufacturing limits are actual limits. On account of macro errors (out of roundness, etc) these limits cannot at present be guaranteed to the bearing users. It is, however, expected that the bearings will fall within acceptance limits.

4.2 Double Row Self-Aligning Bearings

Table 2 Double Row Self-Aligning Ball Bearings with Cylindrical Bore

Clearance values in micrometres

Bore Diameter *d* mm		Group 2		Group 0 (Normal Group)		Group 3		Group 4		Group 5	
Over	Incl	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*
2.5	6	1	8	5	15	10	20	15	25	21	33
6	10	2	9	6	17	12	25	19	33	27	42
10	14	2	10	6	19	13	26	21	35	30	48
14	18	3	12	8	21	15	28	23	37	32	50
18	24	4	14	10	23	17	30	25	39	34	52
24	30	5	16	11	24	19	35	29	46	40	58
30	40	6	18	13	29	23	40	34	53	46	66
40	50	6	19	14	31	25	44	37	57	50	71
50	65	7	21	16	36	30	50	45	69	62	88
65	80	8	24	18	40	35	60	54	83	76	108
80	100	9	27	22	48	42	70	64	96	89	124
100	120	10	31	25	56	50	83	75	114	105	145
120	140	10	38	30	68	60	10	90	135	125	175
140	160	15	44	35	80	70	120	110	161	150	210

Table 3 Double Row Self-Aligning Ball Bearings with Tapered Bore

Clearance values in micrometres

Bore Diameter *d* mm		Group 2		Group 0 (Normal Group)		Group 3		Group 4		Group 5	
Over	Incl	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*	*Min*	*Max*
18	24	7	17	13	26	20	33	28	42	37	55
24	30	9	20	15	28	23	39	33	50	44	62
30	40	12	24	19	35	29	46	40	59	52	72
40	50	14	27	22	39	33	52	45	65	58	79
50	65	18	32	27	47	41	61	56	80	73	99
65	80	23	39	35	57	50	75	69	98	91	123
80	100	29	47	42	68	62	90	84	116	109	144
100	120	35	56	50	81	75	108	100	139	130	170
120	140	40	68	60	98	90	130	120	165	155	205
140	160	45	74	65	110	100	150	140	191	180	240

4.3 Cylindrical Roller Bearings

a) *Cylindrical Bore*

Table 4 Cylindrical Roller Bearings with Cylindrical Bore

Clearance values in micrometres

Bore Diameter *d* mm		Group 2				Group 0 (Normal Group)				Group 3				Group 4				Group 5			
		Interchangeable				Interchangeable				Interchangeable				Interchangeable				Interchangeable			
			Matched				Matched				Matched				Matched				Matched		
Over	Incl	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*
—	10	0	10	20	30	10	20	30	40	25	35	45	55	35	45	55	65	—	—	—	—
10	18	0	10	20	30	10	20	30	40	25	35	45	55	35	45	55	65	55	65	75	85
18	24	0	10	20	30	10	20	30	40	25	35	45	55	35	45	55	65	55	65	75	85
24	30	0	10	25	30	10	25	35	45	30	40	50	65	40	50	60	70	60	70	80	90
30	40	0	12	25	35	15	25	40	50	35	45	55	70	45	55	70	80	70	80	95	105
40	50	5	15	30	40	20	30	45	55	40	50	65	75	55	65	80	90	85	95	110	120
50	65	5	15	35	45	20	35	50	65	45	55	75	90	65	75	90	105	100	110	130	140
65	80	5	20	40	55	25	40	60	75	55	70	90	105	75	90	110	125	115	130	150	165
80	100	10	25	45	60	30	45	70	80	65	80	105	115	90	105	125	140	145	155	180	195
100	120	10	25	50	65	35	50	80	90	80	95	120	135	105	120	145	160	165	180	205	220
120	140	10	30	60	75	40	60	90	105	90	105	135	155	115	135	160	180	185	200	230	250
140	160	15	35	65	80	50	65	100	115	100	115	150	165	130	150	180	195	210	225	260	275
160	180	20	35	75	85	60	75	110	125	110	125	165	175	150	165	200	215	235	250	285	300
180	200	25	40	80	95	65	80	120	135	125	140	180	195	165	180	220	235	260	275	315	330
200	225	30	45	90	105	75	90	135	150	140	155	200	215	180	200	240	255	290	305	350	365
225	250	40	50	100	115	90	100	150	165	155	170	215	230	205	215	265	280	320	330	380	395
250	280	45	55	110	125	100	110	165	180	175	185	240	255	230	240	295	310	355	370	420	435
280	315	50	60	120	135	110	120	180	195	195	205	265	280	255	265	325	340	400	410	470	485
315	355	55	65	135	145	125	135	200	215	215	225	295	305	280	295	360	370	440	455	520	530
355	400	65	75	150	160	140	150	225	235	245	255	330	340	320	330	405	415	500	510	585	595
400	450	70	85	170	190	155	170	255	275	270	285	370	390	355	370	455	565	555	565	650	675
450	500	85	95	190	205	180	190	285	300	300	315	410	420	395	410	505	515	620	625	720	740

NOTES

1 Unless indicated by the manufacturer that rings need to remain together as supplied, the values given in the columns headed "interchangeable" apply even after intermixing of rings.

2 When indicated by the manufacturer that bearings are delivered as matched assemblies, the values given in the columns headed "matched" apply, providing the rings remain together as supplied.

b) *Tapered Bore*

Table 5 Cylindrical Roller Bearings with Tapered Bore

Clearance values in micrometres

Bore Diameter *d* mm		Group 2				Group 0 (Normal Group)				Group 3				Group 4			
		Interchangeable				Interchangeable				Interchangeable				Interchangeable			
			Matched				Matched				Matched				Matched		
Over	Incl	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*	*Min*	*Min*	*Max*	*Max*
—	18	10	20	30	40	25	35	45	55	35	45	55	65	45	55	65	75
18	24	10	20	30	40	25	35	45	55	35	45	55	65	45	55	65	75
24	30	10	25	35	45	30	40	50	65	40	50	60	70	50	60	70	85
30	40	15	25	40	50	35	45	55	70	45	55	70	80	60	70	80	95
40	50	20	30	45	55	40	50	65	75	55	65	80	90	70	80	95	105
50	65	20	35	50	65	45	55	75	90	65	75	90	105	80	90	110	125
65	80	25	40	60	75	55	70	90	105	75	90	110	125	95	110	130	145
80	100	30	45	70	80	65	80	105	115	90	105	125	140	110	125	150	160
100	120	35	50	80	90	80	95	120	135	105	120	145	160	130	145	170	185
120	140	40	60	90	105	90	105	135	155	115	135	160	180	145	160	190	210
140	160	50	65	100	115	100	115	150	165	130	150	180	195	165	180	215	230
160	180	60	75	110	125	110	125	165	175	150	165	200	215	190	200	240	255
180	200	65	80	120	135	125	140	180	195	165	180	220	235	205	220	260	275
200	225	75	90	135	150	140	155	200	215	180	200	240	255	225	240	285	300
225	250	90	100	150	165	155	170	215	230	205	215	265	280	255	265	315	330
250	280	100	110	165	180	175	185	240	255	230	240	295	310	285	295	350	365
280	315	110	120	180	195	195	205	265	280	255	265	325	340	315	325	385	400
315	355	125	135	200	215	215	225	295	305	280	295	360	370	350	360	430	440
355	400	140	150	225	235	245	255	330	340	320	330	405	415	395	405	480	490
400	450	155	170	255	275	270	285	370	390	355	370	455	465	440	455	540	570
450	500	180	190	285	300	300	315	410	420	395	410	505	515	490	505	600	610

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